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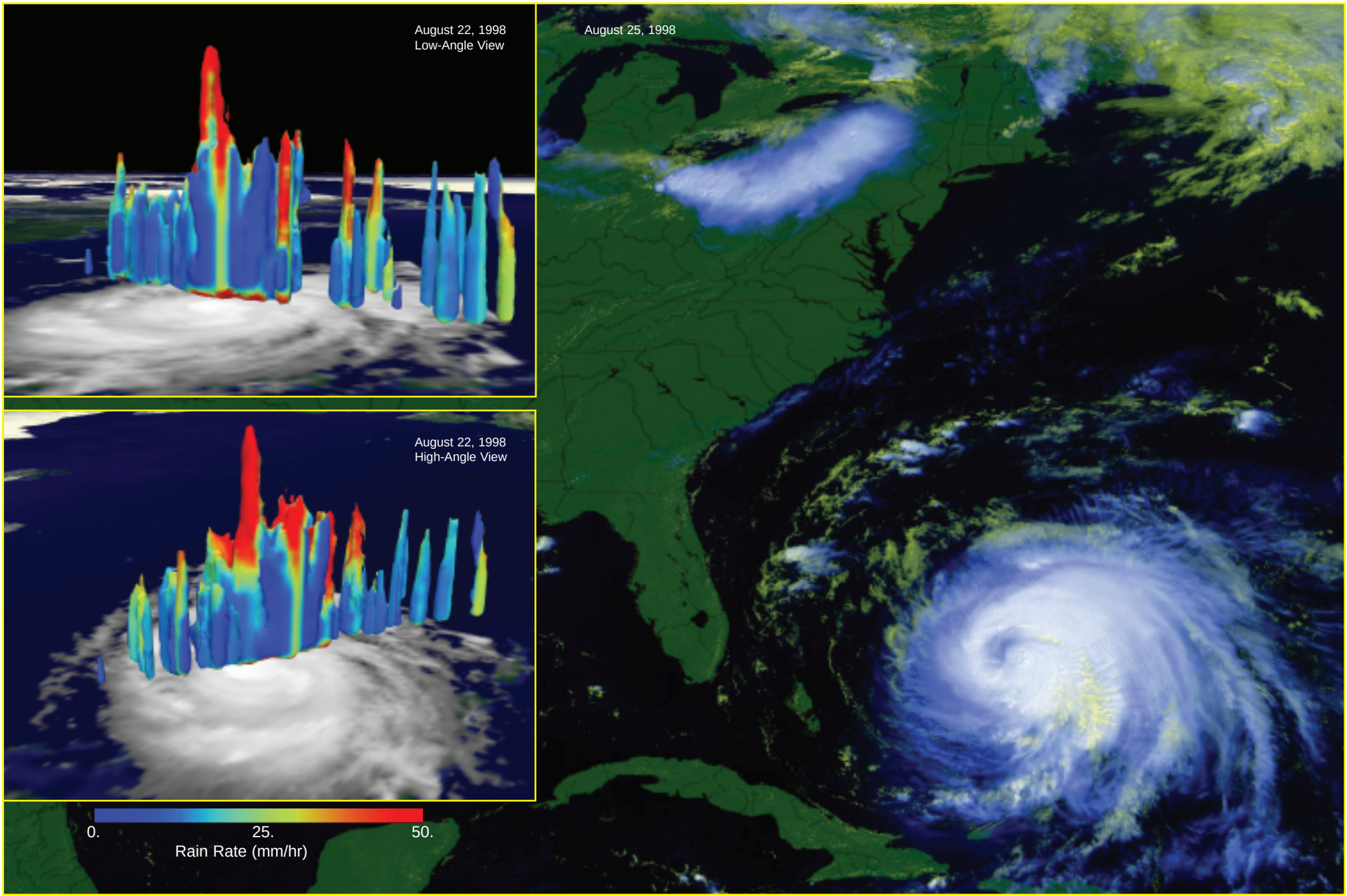
Hurricane Bonnie



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Few things in nature can compare to the destructive force of a hurricane. Called the greatest storm on Earth, a hurricane is capable of destroying coastal areas with sustained winds in excess of 155 mph, intense rainfall and a storm surge.

NASA's Tropical Rainfall Measuring Mission (TRMM) is enabling new perspectives on hurricanes. In this "cat-scan" of Hurricane Bonnie on August 22, 1998, microwave energy from the world's first space-based precipitation radar (similar to ground-based weather radars seen on TV newscasts) records precipitation intensity within the hurricane. The red spike in these compelling images shows the rain rate inside a cumulonimbus storm cloud towering like a skyscraper 18 kilometers (59,000 feet or 11 miles) into the sky from the hurricane's eyewall. These clouds rise high into the atmosphere due to the large amount of latent heat being released as water vapor within the hurricane condenses into liquid. Latent heat is the heat energy released or absorbed during the phase change of a substance—in this case, water. In fact, during its life cycle a hurricane can expend as much energy as 10,000 nuclear bombs!

By comparison, the highest mountain in the world, Mt. Everest, is 8.84 kilometers (29,000 feet or 5.5 miles) and the average commercial jet flies at barely one-half the height of Bonnie's cloud tops. Towering precipitation columns like these may be precursors to hurricane intensification. In fact, Bonnie's central pressure dropped from 977 millibars to 957 millibars in the 24 hours following the date of this image. Bonnie caused close to 1 billion dollars in damage in North Carolina, South Carolina, and Georgia. The red areas indicate the highest precipitation rates (50 millimeters per hour), yellows show intermediate values (25 millimeters per hour), and blues indicate lower values with the darkest blue indicating no precipitation.

The background image comes from the GOES-8 geostationary weather satellite, which shows Bonnie's spiraling cloud structure on August 25, 1998.

About TRMM

The Tropical Rainfall Measuring Mission is a joint NASA and Japan Aerospace Exploration Agency (JAXA) mission and is the first space mission dedicated to studying tropical and subtropical rainfall. TRMM was launched on November 27, 1997, from the Japanese Space Center in Tanegashima, Japan.

Additional Information

For more information on hurricanes visit NASA's Earth Observatory at http://earthobservatory.nasa.gov/Library/Hurricanes/

Additional information on the NASA/JAXA Tropical Rainfall Measuring Mission can be found at http://trmm.gsfc.nasa.gov

TRMM images courtesy of Greg Shirah, Scientific Visualization Studio, NASA Goddard Space Flight Center. GOES-8 image courtesy of Dennis Chesters and Marit Jentoft-Nilsen, Visualization and Analysis Laboratory, NASA Goddard Space Flight Center.

For the Classroom

Hurricane! Remote Sensing Activities
http://www.mcps.k12.md.us/departments/eventscience/EBS.eos.hu.html

Activity 1 provides GOES images from NASA to help students learn to track a hurricane. Activity 2 allows students to investigate the relationship between wind speed in a hurricane and two other factors. *(Courtesy of the Event-Based Science Project through a grant from NASA and scientists from the Goddard Space Flight Center.)*

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